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A REVISION OF LINANTHUS SECT. SIPHONELLA (POLEMONIACEAE)

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Linanthus comprises nearly 40 species and is one of the larger genera in the Polemoniaceae. Four species are suffrutescent perennials, and the rest are annuals. The genus is distributed throughout much of western North America, with one annual species indigenous to Chile. In spite of the size and relatively widespread distribution of the genus, it is one of the least examined in the family from a taxonomic viewpoint.

The four perennials constitute one of the least understood groups in *Linanthus*. These plants were first described by Gray (1870) as two species, *Gilia nuttallii* and *G. floribunda*. Milliken (1904) recognized these two taxa as members of *Linanthus* on the basis of their palmately-lobed leaves. A number of subsequent authors (McMinn, 1939; Munz, 1958; Grant, 1959) were basically in accord with Milliken, while others regarded this complex as belonging in related genera such as *Leptodactylon* (Rydberg, 1906; Jepson, 1925; Tidestrom, 1935) *Navarretia* (Kuntze, 1891), *Siphonella* (Heller, 1912; Jepson, 1943), and *Linanthastrum* (Ewan, 1942; Wherry, 1945) or retained it in its original genus, *Gilia* (Brand, 1907). In addition to these varied generic interpretations, a number of species, subspecies, varieties, and forms have been recognized and named. These will be considered in greater detail in the taxonomic treatment that follows.

The perennial species of *Linanthus* grow predominantly in montane and subalpine localities in many areas in the western United States and northern Mexico (Fig. 1). The distribution of these species is a series of geographically isolated populations corresponding roughly to the mountain ranges. The perennials are characterized morphologically by a suffrutescent habit, opposite, palmately-lobed leaves, calyces with a narrow hyaline membrane between the lobes, and funnelform corollas with stout tubes. They exhibit little morphological variation within any population, but there are populations that differ significantly from each other in one or more characteristics, such as leaf pubescence, calyx pubescence (Fig. 2 a-c), leaf lobe shape (Fig. 2 d-f), number of lobes per leaf, pollen grain diameter, and seed size. In addition, some populations consist only of tetraploids, while others consist only of diploids.

Linanthus laxus (Vasey & Rose) Wherry, an annual, is closely related to the perennials and is characterized by the same calyx and corolla morphology. It is a poorly known species and very few specimens are present in herbaria. Its geographical range is restricted to the coastal canyons near San Quintín, Baja California (Fig. 1). It does not present the same kinds of taxonomic problems that are found in the perennial species; however, it is included in this treatment because of its close relationship to the perennials.

Grant (1959) placed the perennial species of *Linanthus*, plus *L. laxus*, in sect. *Siphonella* (A. Gray) V. Grant, but no attempt to elucidate the relationships of the taxa within the section was made. A revision of sect. *Siphonella* is presented here. It is based on the examination of specimens in the field and over 2400 herbarium specimens. Particular attention was paid to characters whose expressions vary from population to population.

Representatives of each morpho-geographical group were grown in the greenhouse to establish whether a genetic basis exists for the character differences used to distinguish taxa, especially leaf and calyx pubescence and leaf lobe shape. Each of the diagnostic characters examined was retained by each taxon when grown under uniform conditions for at least two growing seasons, and progeny obtained from self-fertilizations maintained these parental features.

Chromosome numbers were counted for eight of the nine taxa considered in this treatment. Six were diploid with a somatic number of $2n = 18$, two were tetraploid, $2n = 36$. Cytological material for *L. floribundus* subsp. *hallii* was not available. Voucher specimens are cited in Table 1 and deposited at UCSB.

Pollen grain diameters were measured for all nine taxa; they range from 23 to 28 μm in diploids, and from 33 to 38 μm in tetraploids. The diameter of pollen grains was used to estimate the chromosome number of specimens from regions where live material was unavailable. On this basis, *L. floribundus* subsp. *hallii* is considered to be diploid.

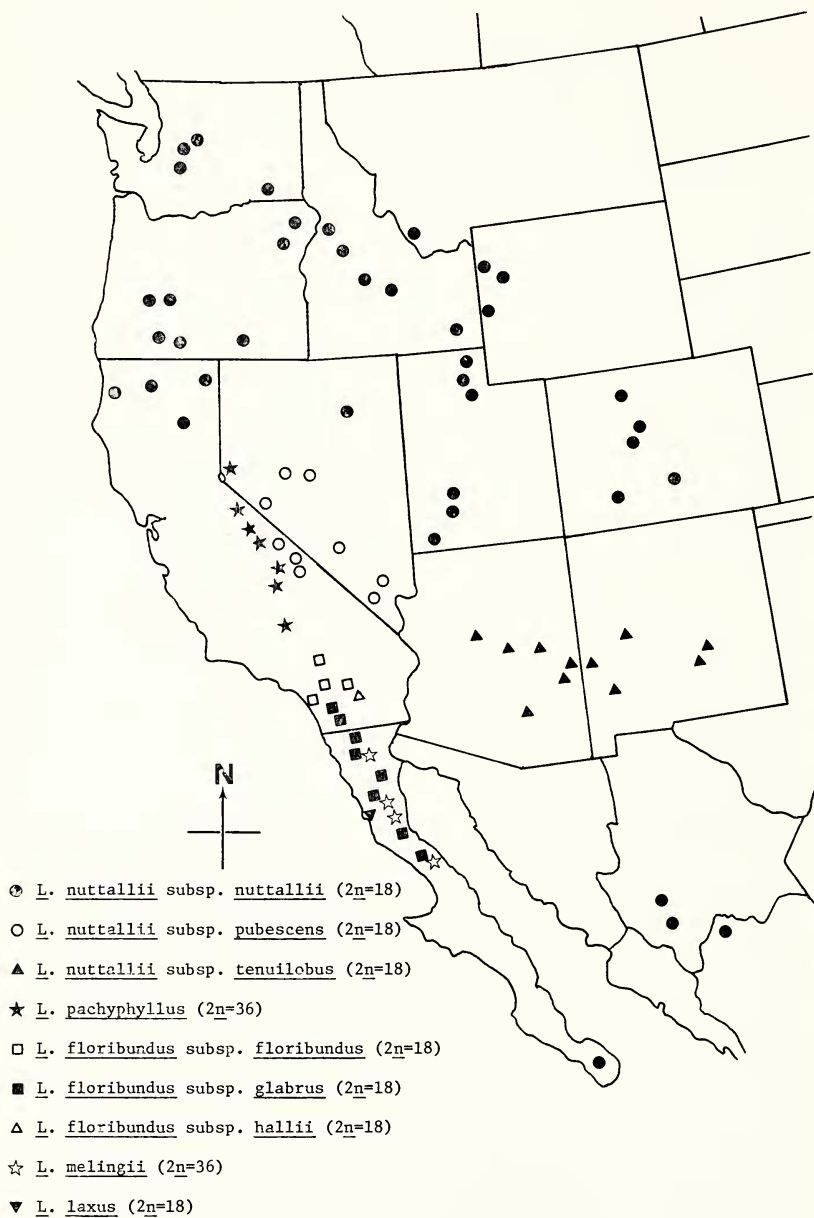


FIG. 1. Geographical distribution of *Linanthus* sect. *Siphonella*.

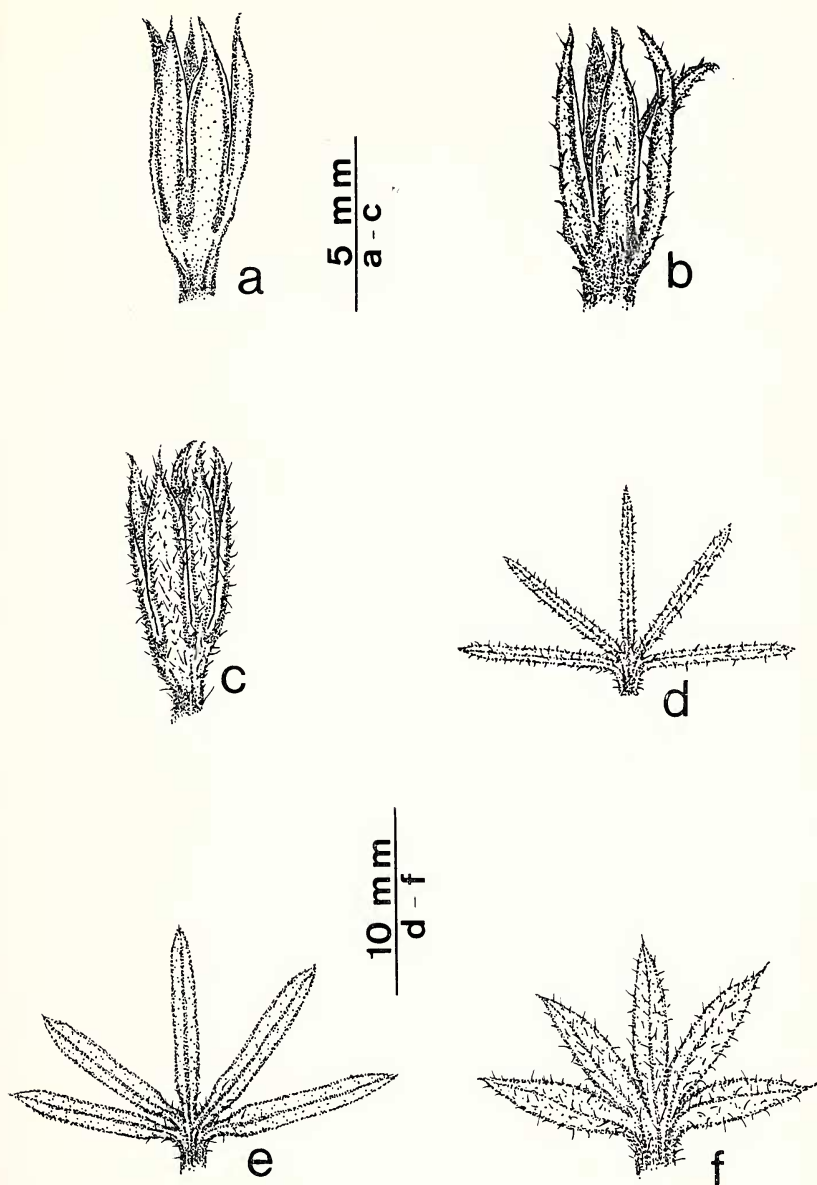


FIG. 2. a-c. Calyx pubescence in *Linanthus* sect. *Siphonella*. a, *L. floribundus* subsp. *glabrus* (Patterson 1021) showing glabrous calyx. b, *L. nuttallii* subsp. *nuttallii* (Patterson 1032) showing lightly pubescent calyx. c, *L. nuttallii* subsp. *pubescens* (Patterson 1012) showing densely pubescent calyx. d-f, Variation in leaf lobe shape in sect. *Siphonella*. d, *L. nuttallii* subsp. *tenuilobus* (Patterson 1009). e, *L. nuttallii* subsp. *nuttallii* (Patterson 1030). f, *L. pachyphyllus* (Patterson 1001), also found in *L. melingii*. Drawings by B. Tanowitz.

TABLE 1. CHROMOSOME COUNTS FOR LINANTHUS SECT. SIPHONELLA.

- L. nuttallii* (A. Gray) Greene ex Milliken subsp. *nuttallii*; $2n = 18$.
 COLORADO: Eagle Co.: Tennessee Pass, *Patterson 1031*. Lake Co.: 3 mi SW of Climax, *Patterson 1030*.
 IDAHO: Blaine Co.: Trail Creek Summit, *Patterson 1033*.
 WYOMING: Lincoln Co.: Allred Springs Campground, *Patterson 1032*.
- L. nuttallii* (A. Gray) Greene ex Milliken subsp. *pubescens* R. Patterson; $2n = 18$.
 CALIFORNIA: Mono Co.: Junction of White Mountain and Silver Canyon Roads, *Patterson 1013*.
 NEVADA: Clark Co.: Mary Jane Falls Campground, *Patterson 1012*.
- L. nuttallii* (A. Gray) Greene ex Milliken subsp. *tenuilobus* R. Patterson; $2n = 18$.
 ARIZONA: Gila Co.: Camp Verde-Strawberry Road, one mi W of Strawberry, *Patterson 1009*.
- L. pachyphyllus* R. Patterson; $2n = 36$.
 CALIFORNIA: Inyo Co.: Bishop Creek near South Lake Road, *Patterson 1001*; two mi E of Onion Valley, on Independence Road, *Patterson 1002*.
 Kern Co.: one mi SW of Piute Mountain, *Smith s.n.* Mono Co.: Lee Vining Creek, just S of ranger station, *Patterson 1000*; Rock Creek, *Meyers s.n.*
- L. floribundus* (A. Gray) Greene ex Milliken subsp. *glabrus* R. Patterson; $2n = 18$.
 CALIFORNIA: Riverside Co.: Santa Rosa Mountains, *Meyers s.n.* San Diego Co.: Four mi S of Tenaja Campground, on road to Fallbrook, *Patterson 1020*.
- L. floribundus* (A. Gray) Greene ex Milliken subsp. *glabrus* R. Patterson; $2n = 18$.
 CALIFORNIA: San Diego Co.: nine mi NE of U.S. Highway 80, on county road S-1, *Patterson 1011*.
- L. melingii* (Wiggins) V. Grant; $2n = 36$.
 BAJA CALIFORNIA: The observatory, Sierra San Pedro Mártir, *Haller s.n.*
- L. laxus* (Vasey & Rose) Wherry; $2n = 18$.
 BAJA CALIFORNIA: Arroyo Socorro, *Moran 19330*, *Moran & Reveal 20281*, *Moran 20593*.

TAXONOMY

LINANTHUS Benth. sect. SIPHONELLA (A. Gray) V. Grant, Natural history of the *Phlox* family 106. 1959.—*Gilia* sect. *Siphonella* A. Gray, Proc. Amer. Acad. Arts 8:266. 1870 (Based on a generic name in Nuttall's herbarium).—*Siphonella* (A. Gray) Heller, Muhlenbergia 8:57. 1912.—TYPE: *Linanthus nuttallii* (A. Gray) Greene ex Milliken. Suffrutescent perennials and one annual; leaves opposite, mostly palmately lobed; inflorescence ranging from dense, subcapitate clusters to sub-panicles, rarely solitary; pedicels present or absent; calyx herbaceous with narrow hyaline membrane connecting the lobes to about one-half their length; corolla funnelform, tube stout, equalling to twice as long as the calyx; stamens inserted on corolla throat; pollen grains 23–38 μm in diameter, yellow; style divided into three lobes, each as long as the united style body, the point of trifurcation stigmatic; fruit a three-parted septicidal capsule; seeds smooth, light to dark brown, non-mucilaginous.

Key to *Linanthus* sect. *Siphonella*

Plants suffrutescent perennials; mostly montane or subalpine, seldom below 500 m.

Leaves palmately-lobed.

Leaves predominantly 5-lobed.

Leaf lobes linear to linear-lanceolate.

Leaf lobes linear; corolla tube equalling calyx; seeds 1.5–2.0 mm long.

Leaf lobes and calyces subglabrous to lightly pubescent, never densely so; wide ranging in Rocky Mountains, eastern Great Basin ranges, ranges of Washington, Oregon, and northern California, and the Sierra Madre Occidental of Mexico. 1a. *L. nuttallii* subsp. *nuttallii*

Leaf lobes and calyces densely hirtellous; dry mountain ranges of Nevada and eastern California.

. 1b. *L. nuttallii* subsp. *pubescens*

Leaf lobes linear-lanceolate; corolla tube often exceeding the calyx; seeds 2.5–3.5 mm long; Sierra Nevada.

. 2. *L. pachyphyllus*

Leaf lobes nearly filiform; mountains of central Arizona and New Mexico. 1c. *L. nuttallii* subsp. *tenuilobus*

Leaves predominantly 3-lobed.

Leaves and calyces glabrous to moderately pubescent; plants usually robust, to over 3 dm high; mountain ranges of southern California and Baja California.

Leaves and/or calyces subglabrous to moderately pubescent.

. 3a. *L. floribundus* subsp. *floribundus*

Leaves and calyces glabrous. 3b. *L. floribundus* subsp. *glabrus*

Leaves and calyces densely hirtellous; plants compact, often matted; higher elevations of the Sierra Juarez, Sierra San Pedro Mártir, and Sierra San Borja, Baja California.

. 4. *L. melingii*

Leaves mostly entire; dry eastern slopes of coast ranges of southern California and Baja California. 3c. *L. floribundus* subsp. *hallii*

Plants annual; occurring below 100 m; coastal areas near San Quintín, Baja California. 5. *L. laxus*

1a. LINANTHUS NUTTALLII (A. Gray) Greene ex Milliken subsp. NUTTALLII, Univ. Calif. Publ. Bot. 2:54. 1904.—*Gilia nuttallii* A. Gray, Proc. Amer. Acad. Arts 8:267. 1870.—*Navarretia nuttallii* (A. Gray) Kuntze, Revisio generum plantarum 2:432. 1891.—*Leptodactylon nuttallii* (A. Gray) Rydberg, Bull. Torrey Bot. Club 33:149. 1906.—*Siphonella nuttallii* (A. Gray) Heller, Muhlenbergia 8:57. 1912.—

Linanthastrum nuttallii (A. Gray) Ewan, J. Wash. Acad. Sci. 32:139. 1942.—LECTOTYPE (here designated): R. Mts. Bear R. Hills, *Nuttall s.n.* (PH, seen only as photograph; isolectotype: GH!).

Gilia nuttallii A. Gray var. *montana* Brand, Pflanzenreich 4(250):125. 1907.—SYNTYPES: *Allen 119*, *Hall 941*, *Parish 3686*, and *Purpus 1443*.

Gilia nuttallii A. Gray var. *parviflora* Brand, Pflanzenreich 4(250):125. 1907.—SYNTYPES: *Baker 1053*, *Cusick 255*, and *Jones 1106*.

Perennial herb from woody base, stems erect, 1–4 dm high, slightly puberulent; leaves mostly 5-partite into linear lobes, 6–32 mm long, subglabrous to moderately pubescent; flowers mostly sessile in upper axils, in dense subcapitate clusters; calyx narrow-campanulate, 8–10 mm long, tube 2–4 mm long, lobes lance-subulate, slightly pubescent; corolla 12–16 mm long, tube 8–10 mm long, white, pubescent on outer surface, throat short, yellow, lobes 5–8 mm long, oval to oblanceolate; stamens inserted at base of throat or just below, glabrous, barely exerted to included; pollen 23–28 μ m in diameter; chromosome number $2n = 18$.

Distribution (Fig. 1) and phenology: Cascade range from central Washington to northern California; high ranges of eastern Washington, Oregon, and northeastern California; Rocky Mountains from central Idaho to southern Colorado; higher ranges of Utah; Sierra Madre Occidental of Chihuahua and Durango; Sierra de la Victoria, Baja California. Flowering July to August (June to September). The populations of *L. nuttallii* subsp. *nuttallii* from the Sierra Madre Occidental and the Sierra de la Victoria present an interesting disjunction from the majority of populations of this subspecies. The nearest population of subsp. *nuttallii* is in southern Colorado. The Mexican populations are poorly represented in herbarium collections, but the regions within the area of disjunction (e.g., Arizona and New Mexico) are well known botanically; hence, the disjunction is not simply the result of insufficient collecting. Future studies on the nature and significance of this disjunction should be rewarding from a systematic viewpoint after the range of *L. nuttallii* subsp. *nuttallii* in Mexico is better known.

Representative specimens: CALIFORNIA: Little Lily Lake, *Wheeler 3789* (GH, NY, UC, US, UTC). COLORADO: Tennessee Pass, *Clokey 3549* (CAS, DS, GH, MICH, NY, POM, TEX, US, UTC, WSU); Rabbit Ears Pass, *Gooding 1540* (COLO, DS, GH, MO, NY, RM, UC, US). IDAHO: Squaw Valley, *Macbride & Payson 3388* (CAS, DS, GH, MO, NY, POM, RM, UC, US); 3.5 mi SW Stanley Lake, *Hitchcock & Muhlick 9635* (NY, RM, UC, UTC, WSU, WTU); Trinity Lake region, *Macbride 691* (DS, GH, MO, NY, RM, UC, US, WSU, WTU). NEVADA: Lamoille Terrace Ranger Station, *Maguire & Holmgren 22166* (GH, NY, UC, UTC). OREGON: near Cornucopia, *Thompson 13353* (CAS, COLO, GH, MO, NY, RSA, UC, UTC, WSU); along Musick Mine Road,

Dennis 2313 (ASU, CAS, DS, ID, NY, OSU, RSA, US, UTC, WSU, WTU). UTAH: *Alta, Jones 1106* (ARIZ, GH, MICH, NY, OSU, RSA, US, UTC, WSU). WASHINGTON: alpine slopes of Mt. Wow, *Thompson 12585* (CAS, DS, GH, MO, NY, POM, UC, US, WSU, WTU); Blue Mountains, *Piper 2419* (GH, WSU). WYOMING: Teton Pass, *Cronquist 831* (ID, UC, UTC). BAJA CALIFORNIA: La Laguna, *Gentry 4372* (ARIZ, DS, MO, UC, US). CHIHUAHUA: SW Chihuahua, *Palmer 398* (MO, NY, US).

1b. *Linanthus nuttallii* (A. Gray) Greene ex Milliken subsp. **pubescens** R. Patterson, subsp. nov.—TYPE: California, Inyo County, White Mountains, junction of White Mountain and Silver Canyon Roads, 3100 m, 2 Aug 1970, *Patterson 1009* (Holotype: UC!; isotypes: NY!, UCSB!).

Herba perennis, 1–4 dm alta; folia plerumque 5-partita, moderate vel dense pubescentia, lobis linearis; flores sessiles racemis subcapitatis; calyces moderate vel dense pubescentes; chromosomatum numerus $2n = 18$.

Distribution (Fig. 1) and phenology: Dry mountain ranges of central and southern Nevada and the White and Inyo Ranges of California, mostly above 2800 m. Flowering July to August (June to September).

Representative specimens: CALIFORNIA: Wyman Creek, *Duran 3048* (ARIZ, CAS, DS, GH, MICH, MO, NY, POM, RM, SD, UC, US, UTC); 1.5 mi N of New York Butte, *Alexander & Kellogg 3083* (ARIZ, DS, MO, UC, US, UTC). NEVADA: Charleston Park, *Clokey 7253* (ARIZ, CAS, COLO, DS, GH, ID, MICH, MO, NY, OSU, POM, RM, TEX, UC, US, UTC, WSU); 2 mi N of Toiyabe Dome, *Hitchcock & Martin 5598* (DS, POM, UC, UTC, WSU).

1c. *Linanthus nuttallii* (A. Gray) Greene ex Milligen subsp. **tenuilobus** R. Patterson, subsp. nov.—TYPE: Arizona, Gila County, one mile east of Strawberry on Camp Verde-Strawberry Road, 1700 m, 22 Aug 1970, *Patterson 1013* (Holotype: UC!; isotypes: NY!, UCSB!).

Herba perennis, 1–4 dm alta; folia plerumque 5-partita, parce pubescentia, lobis tenuibus; flores sessiles racemis subcapitatis; calyces parce vel moderate pubescentes; chromosomatum numerus $2n = 18$.

Distribution (Fig. 1) and phenology: Mountain ranges of central Arizona and New Mexico, and in the Santa Catalina Mountains of southern Arizona, mostly above 1500 m. Flowering July to August (June to September).

Representative specimens: ARIZONA: Strawberry Valley, *Toumey 201* (ARIZ, DS, GH, POM, US); 3 mi S of Stray Horse Camp, *Parker & McClintock 7662* (ARIZ, CAS, COLO, MO, RSA, UC). NEW MEXICO: Mogollon Mountains, *Rusby 272* (MICH, MO, NY); White Mountains, *Wootton 205* (DS, GH, MO, NY, POM, RM, UC, US).

2. ***Linanthus pachyphyllus*** R. Patterson, sp. nov.—TYPE: California, Mono County, Lee Vining Grade, 9000 ft, 30 Jun 1934, *Keck, Abrams, & Blake 2872* (Holotype: UC!; isotypes: CAS!, DS!, GH!, POM!, US!).

Herba perennis e basi lignea; caules erecti, 1–4 dm alta, moderate vel dense pubescentes; folia plerumque 5-partita, moderate vel dense pubescentia, lobis lineari-oblongatis, 3–30 mm longa; flores sessiles in axiles superioribus ramorum fascientes racemos dense subcapitados; calyx superioribus ramorum fascientes racemos dense subcapitados; calyx tenui-campanulatus, 8–10 mm longus, dense pubescens, tubo 3–5 mm longo, lobis lanci-subulatis; corolla 12–18 mm longa, tubo 8–12 mm longo, albo, externe pubescente, fauce brevi, flavo, lobae 5–8 mm longi, albi, ovali-oblongati; stamina basi faucis vel modo infra inserta, glabrata, vix-moderate exserta; pollinis granula 33–38 μm diametro; semina fulva, 2.5–3.5 mm longa; chromosomatum numerus $2n = 36$.

Distribution (Fig. 1) and phenology: *Linanthus pachyphyllus* is restricted to the Sierra Nevada of California and western Nevada. Its southernmost limit is near Piute Mountain in Kern County, California, and its northernmost limit is near Mt. Rose in Washoe County, Nevada. Flowering June to July (May to September).

Representative specimens: CALIFORNIA: Lee Vining, *Benson 3767* (NY, POM, RM, UC, US); Sabrina Lake, *Jones s.n.* (CAS, DS, GH); Farewell Gap, *Baker 4536* (CAS, DS, GH, MO, NY, POM, US). NEVADA: Zephyr Point, *Mason 12161* (ARIZ, CAS, COLO, DS, GH, ID, MICH, MO, NY, POM, RM, UC, US, UTC, WSU).

- 3a. **LINANTHUS FLORIBUNDUS** (A. Gray) Greene ex Milliken subsp. FLORIBUNDUS, Univ. Calif. Publ. Bot. 2:55. 1904.—*Gilia floribunda* A. Gray, Proc. Amer. Acad. Arts 8:267. 1870.—*Linanthus nuttallii* (A. Gray) Greene ex Milliken var. *parviflora* Brand subvar. *floribunda* (A. Gray) Brand, Pflanzenreich 4(250):125. 1907.—*Leptodactylon nuttallii* (A. Gray) Rydberg var. *floribundum* (A. Gray) Jepson, Manual of the flowering plants of California 808. 1925.—*Leptodactylon floribundum* (A. Gray) Tidestrom, Proc. Biol. Soc. Wash. 48:42. 1935.—*Linanthus nuttallii* (A. Gray) Greene ex Milliken var. *floribundus* (A. Gray) McMinn, Illustrated manual of California shrubs 446. 1939.—*Linanthastrum nuttallii* (A. Gray) Ewan subsp. *floribundum* (A. Gray) Ewan, J. Wash. Acad. Sci. 32:139. 1942.—*Siphonella floribunda* (A. Gray) Jepson, A flora of California 3:218. 1943.—*Linanthastrum floribundum* (A. Gray) Wherry, Amer. Midl. Naturalist 34:218. 1945.—*Linanthus nuttallii* (A. Gray) Greene ex Milliken subsp. *floribundus* (A. Gray) Munz, Aliso 4:96. 1958.—LECTOTYPE (here designated): California, *Coulter 454* (GH!).

Linanthus saxiphilus A. Davidson, Bull. S. Calif. Acad. Sci. 19:10. 1920.—*Linanthastrum floribundum* (A. Gray) Wherry forma *saxiphilum*

(A. Davidson) Wherry, Amer. Midl. Naturalist 34:386. 1945.—TYPE: California, San Bernardino County, Seven Oaks, Jul 1901, *Davidson 2242* (Holotype: US!).

Suffrutescent perennial, 1–4 dm high; leaves mostly 3-partite, lobes linear, 6–24 mm long; inflorescence an open subcapitate panicle to nearly solitary; flowers mostly pedicellate with pedicels 1–6 mm long; calyx puberulent, narrow-campanulate, 8–9 mm long, lobes lance-subulate; pollen grains 23–28 μm in diameter; chromosome number $2n = 18$.

Distribution (Fig. 1) and phenology: San Bernardino, Santa Margarita, and Santa Rosa Mountains of southern California, rarely in adjacent ranges. Flowering April to June (March to August).

Representative specimens: BAJA CALIFORNIA: Cerro el Sauco, *Moran 8090* (ARIZ, RSA, SD). CALIFORNIA: near Seven Oaks, *Parish 3686* (ARIZ, CAS, DS, GH, NY, UC, US); Laguna Mountains, *Spencer 958* (GH, NY, POM).

3b. *Linanthus floribundus* (A. Gray) Greene ex Milliken subsp. **glabrus** R. Patterson, subsp. nov.—TYPE: California, San Diego County, 9 mi NE of U.S. highway 80 on county road S-1, 1700 m, 3 Apr 1971, *Patterson 1011* (Holotype: UC! isotypes: NY!, UCSB!).

Herba perennis, 1–4 dm alta; caules glabrati vel leviter puberuli; folia plerumque 3-partita, glabrata, lobis linearis vel filiformibus; calyx glabratus; chromosomatum numerus $2n = 18$.

Distribution (Fig. 1) and phenology: Most of the high mountain ranges of southern California excluding the San Bernardino Mountains; the higher ranges of northern Baja California, mostly below 200 m. Flowering April to June (March to July).

Representative specimens: BAJA CALIFORNIA: Rancho El Barril, *Moran 13840* (ARIZ, RSA, SD, UC). CALIFORNIA: Descanso, *Epling s.n.* (COLO, DS, MO, NY, RSA, UC).

3c. LINANTHUS FLORIBUNDUS (A. Gray) Greene ex Milliken subsp. **HALLII** (Jepson) H. L. Mason, in Abrams, Ill. Fl. Pacific States 3:431. 1961.—*Siphonella floribunda* (A. Gray) Jepson var. *hallii* Jepson, Flora of California 3:218. 1943.—*Linanthastrum floribundum* (A. Gray) Wherry forma *hallii* (Jepson) Wherry, Amer. Midl. Naturalist 34:386. 1945.—TYPE: California, San Diego County, Coyote Canyon, in the lower Sonoran zone, 600 ft, Apr 1902, *Hall 2767a* (Holotype: JEPS!; isotype: UC!).

Perennial herb, 1–4 dm high; stems slightly puberulent; leaves entire, linear, rarely 3-partite on lower branches, glabrous; calyx moderately pubescent to glabrous; pollen grain diameter 23–28 μm .

Distribution (Fig. 1) and phenology: Dry washes below 700 m in southern Santa Rosa Mountains, Riverside and San Diego Counties, California. Flowering late March and May.

Representative specimens: CALIFORNIA: Rockhouse Canyon, *Jaeger 1088* (DS, POM); Martinez Canyon, *Davidson s.n.* (UC); Thermal, *Davidson s.n.* (DS); Elder Canyon, *Woglum 3041* (RSA); canyon east of Clark Dry Lake, *Buechner 694* (RSA); Palm Canyon, *Gander 1277* (SD).

4. *LINANTHUS MELINGII* (Wiggins) V. Grant, Natural history of the *Phlox* family 107. 1959.—*Leptodactylon melingii* Wiggins, Contr. Dudley Herb. 1:173. 1933.—*Linanthastrum melingii* (Wiggins) Wherry, Amer. Midl. Naturalist 34:386. 1945.—TYPE: Baja California, in gravelly soil along the margins of an open meadow at La Encantada, Sierra San Pedro Mártir, 2100 m, 18 Sep 1930, *Wiggins & Demaree 4884* (Holotype: DS! isotype: UC!).

Low suffrutescent perennial, branches 3–15 cm long, often forming dense mats to 3 dm in diameter; leaves 3-partite, lobes 3–6 mm long, linear-lanceolate, densely hirtellous; flowers sessile in subcapitate clusters, rarely solitary; calyx narrow campanulate, 4–5 mm long, hirtellous, tube 1 mm long, lobes 3–4 mm long; corolla white with yellow throat, often tinged with purple, tube 4–5 mm long, lobes 4–5 mm long, ovate; stamens inserted in throat, barely exserted; pollen grains 33–38 μm in diameter; chromosome number $2n = 36$.

Distribution (Fig. 1) and phenology: High elevations (above 2000 m) in the Sierra Juárez, Sierra San Pedro Mártir, and Sierra San Borja, Baja California. Flowering July to August (June to September).

In Wiggins' original description of *Leptodactylon melingii*, he characterized this species in part as having wingless seeds in differentiating it from *Leptodactylon nuttallii*; however, the examination of numerous herbarium specimens indicates that none of the members of sect. *Siphonella* possess winged seeds (Patterson, 1975).

Munz (1959) cited *Linanthus melingii* as occurring in the White Mountains of California and Nevada, and in the Toiyabe Mountains of Nevada. There are plants that have the same habit as *L. melingii* in these localities; however, these individuals are characterized by 5-partite leaves and are recognized herein as *L. nuttallii* subsp. *pubescens*. In addition, pollen grain diameters of the Toiyabe and White Mountains specimens vary between 23–28 μm , indicating that they are diploids.

Representative specimens: BAJA CALIFORNIA: 8 mi N of Vallecitos, *Breedlove 16306* (CAS, MICH); Hansen's Ranch, *Orcutt 128* (UC, US).

5. *LINANTHUS LAXUS* (Vasey & Rose) Wherry, Amer. Midl. Naturalist 34:386. 1945.—*Gilia laxa* Vasey & Rose, Proc. U. S. Natl. Mus. 11: 531. 1889.—TYPE: Baja California, San Quintín Bay, Jan 1889, *Palmer 650* (Holotype: US!; isotype: UC!).

Linanthus wigginsii Mason, Madroño 6:203. 1942.—TYPE: Baja California, southern end of Santa María Plains, 5 Feb 1935, *Wiggins 7557*

(Holotype: DS!; isotype: UC!)

Slender annual, 3–15 cm high; stems erect, glabrous to slightly pubescent; leaves 3-partite (rarely 5-partite), lobes 5–20 mm long, linear, glabrous to slightly pubescent; inflorescence solitary to subpaniculate, pedicels 2–16 mm long; calyx narrow-campanulate, 4–5 mm long, tube 1 mm long, lobes 3–4 mm long, glabrous to moderately pubescent; corolla tube equal to or slightly exceeding the calyx, white with yellow throat, lobes 5 mm long, white, obovate; stamens inserted below throat, 1.5–2.0 mm long, barely exserted; pollen grains 23–28 μm in diameter; chromosome number $2n = 18$.

Distribution (Fig. 1) and phenology: Coastal canyons and plains, Río Santa María, San Quintín, and Arroyo Socorro, Baja California. Flowering January to April.

Representative specimens: BAJA CALIFORNIA: Arroyo Socorro, *Moran 19330* (SD, UCSB), *Moran & Reveal 20281* (SD, UCSB), *Moran 20593* (SD, UCSB); Santa María, *Orcutt s.n.* (MO); north of San Quintín Bay, *Raven 12370* (UC).

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A NEW SUBSPECIES OF *HULSEA VESTITA* (ASTERACEAE)

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The *Hulsea vestita* complex of California and Nevada comprises five currently recognized subspecies of self-incompatible, densely lanate, caespitose, herbaceous perennials with a dimorphic, quadripartite, paleoaceous pappus and a uniform diploid complement of 38 chromosomes (Wilken, 1975). Of particular interest within this complex is the occurrence in the western Transverse Ranges of southern California of populations that have been variously treated in several floristic works. Specific epithets applied to these populations include *H. callicarpa* (Hall) Rydberg, *H. parryi* A. Gray, and *H. vestita* A. Gray (Rydberg, 1914; Jepson, 1951; Keck, 1959; Ferris, 1960; Munz, 1974). Recently, I postulated (Wilken, 1975) that these populations represent an intergrading complex involving ssp. *vestita* and ssp. *parryi*. This hypothesis was based on observations of leaf morphology and ray flower number. Further study has revealed, however, that populations from the western Transverse Ranges, particularly the San Gabriel Mountains, display discordant variation with respect to presently circumscribed taxa. It is the purpose of this paper to discuss the relationships and status of these problematical populations by a numerical analysis of morphological variation and studies of synthetic hybrids.

MATERIALS AND METHODS

Field studies were begun in 1970 and seeds were collected to serve as a source of parental strains for an extensive crossing program. Methods with respect to crossing attempts and studies of meiosis and hybrid fertility (= pollen stainability and seed set) were as described elsewhere (Wilken, 1975). During the spring and summer of 1972, a series of populations, derived from 18 natural populations, were grown from seed to flowering maturity in a common garden at Occidental College, Los Angeles, California. These garden populations represented all recognized subspecies of *Hulsea vestita* and six populations from widely sepa-